

TVS Diode

Transient Voltage Suppressor Diodes

ESD201-B2-03LRH

Bi-directional Dual Diode for ESD/Transient Protection

ESD201-B2-03LRH

Data Sheet

Revision 1.1, 2012-09-26
Final

Edition 2012-09-26

**Published by
Infineon Technologies AG
81726 Munich, Germany**

**© 2012 Infineon Technologies AG
All Rights Reserved.**

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History: Rev. 1.0, 2012-09-19

Page or Item	Subjects (major changes since previous revision)
--------------	--

Revision 1.1, 2012-09-26

3	Small changes in the Features

Trademarks of Infineon Technologies AG

AURIX™, BlueMoon™, C166™, CanPAK™, CIPOS™, CIPURSE™, COMNEON™, EconoPACK™, CoolMOS™, CoolSET™, CORECONTROL™, CROSSAVE™, DAVE™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPIM™, EiceDRIVER™, eupec™, FCOS™, HITFET™, HybridPACK™, I²RF™, ISOFACE™, IsoPACK™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OptiMOS™, ORIGA™, PRIMARION™, PrimePACK™, PrimeSTACK™, PRO-SIL™, PROFET™, RASIC™, ReverSave™, SatRIC™, SIEGET™, SINDRION™, SIPMOS™, SMARTi™, SmartLEWIS™, SOLID FLASH™, TEMPFET™, thinQ!™, TRENCHSTOP™, TriCore™, X-GOLD™, X-PMU™, XMM™, XPOSYS™.

Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, KEIL™, PRIMECELL™, REALVIEW™, THUMB™, µVision™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-iq™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. Mifare™ of NXP. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Satellite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2010-10-26

1 Bi-directional Dual Diode for ESD / Transient Protection

1.1 Features

- ESD / Transient protection of signal lines according to:
 - IEC61000-4-2 (ESD): ± 20 kV (air/contact discharge)
 - IEC61000-4-4 (EFT): 40 A (5/50 ns)
 - IEC61000-4-5 (surge): 2.5 A (8/20 μ s)
- Dual diode with small form factor of 0402 package size
- Bi-directional, symmetrical working voltage: $V_{RWM} = \pm 5.5$ V max.
- Low capacitance: $C_L = 5$ pF typ
- Very low clamping voltage, low dynamic resistance down to: $R_{DYN} = 0.22$ typ
- Pb-free (RoHS compliant) and halogen free package



1.2 Application Examples

- ESD protection to keypad, touchpad, buttons, audio lines, ect.

1.3 Product Description

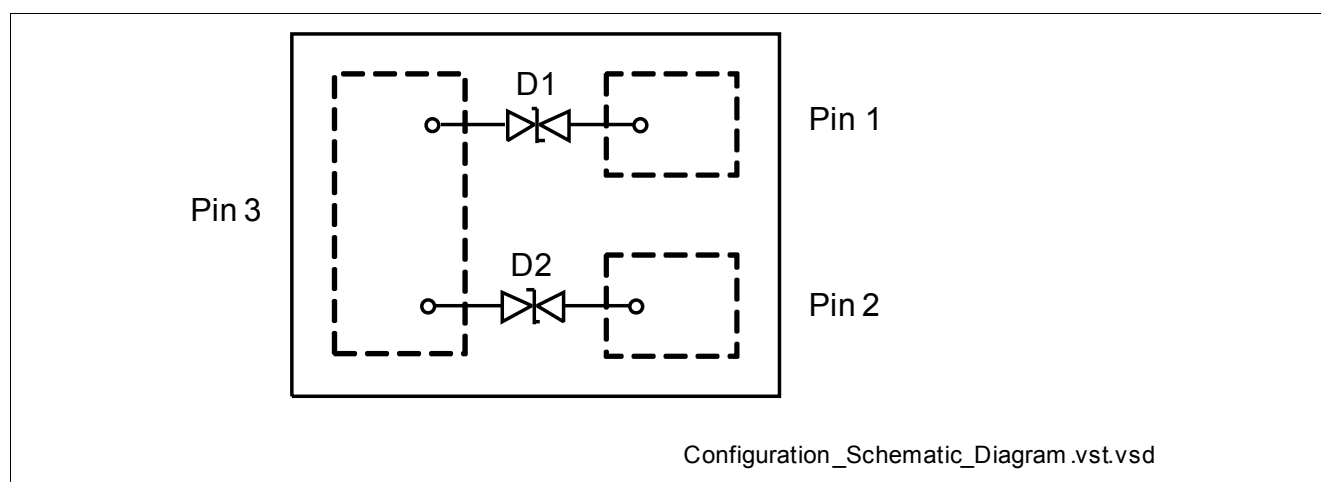


Figure 1-1 Pin Configuration and Schematic Diagram

Table 1-1 Ordering Information

Type	Package	Configuration	Marking code
ESD201-B2-03LRH	TSLP-3-9	2 line, bi-directional	44

2 Characteristics

2.1 Maximum Ratings

Table 2-1 Maximum Ratings at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD air/contact discharge ¹⁾	V_{ESD}	-	-	20	kV
Operating temperature range	T_{OP}	-55	-	125	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-65	-	150	$^{\circ}\text{C}$

1) V_{ESD} according to IEC61000-4-2 ($R = 330\text{ }\Omega$, $C = 150\text{ pF}$ discharge network)

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

2.2 Electrical Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

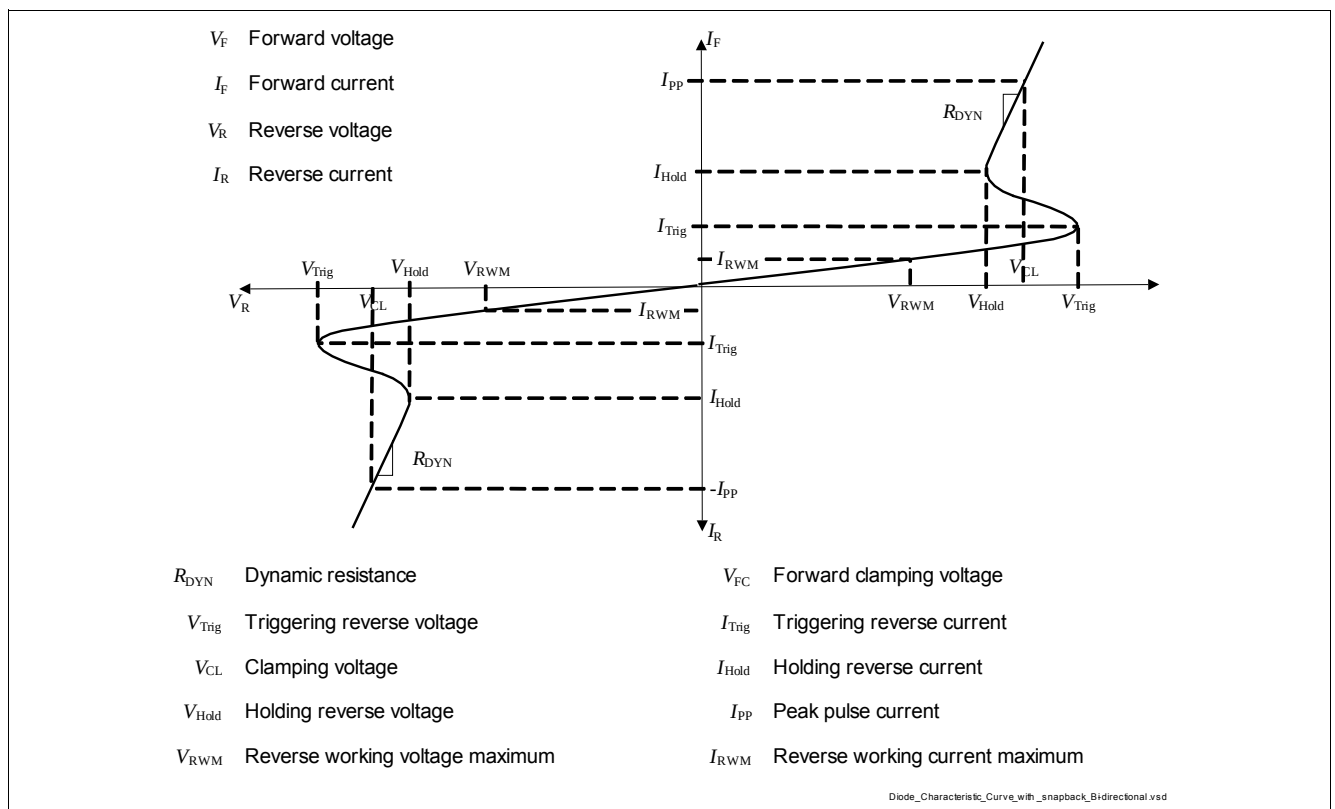


Figure 2-1 Definitions of electrical characteristics

Characteristics

Table 2-2 DC Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	V_{RWM}	-5.5	–	5.5	V	
Reverse current	I_R	–	–	100	nA	$V_R = 5.5\text{ V}$

Table 2-3 AC Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance to GND	C_L	–	5	7	pF	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$

Table 2-4 ESD Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Clamping voltage ¹⁾ Pin1 or Pin2 to Pin3 (GND) Pin3 (GND) to Pin1 or Pin2	V_{CL}	–	12.1 10.2	–	V	$t_p = 100\text{ ns}$ $I_{PP} = 16\text{ A}$ $I_{PP} = 16\text{ A}$
Dynamic resistance ¹⁾ Pin1 or Pin2 to Pin3 (GND) Pin3 (GND) to Pin1 or Pin2	R_{DYN}	–	0.37 0.22	–	Ω	$t_p = 100\text{ ns}$

1) Please refer to Application Note AN210[1]. TSLP parameter: $Z_0 = 50\text{ }\Omega$, $t_p = 100\text{ ns}$, $t_r = 300\text{ ps}$

3 Typical Characteristics

The curves are all specified at $T_A = 25\text{ °C}$

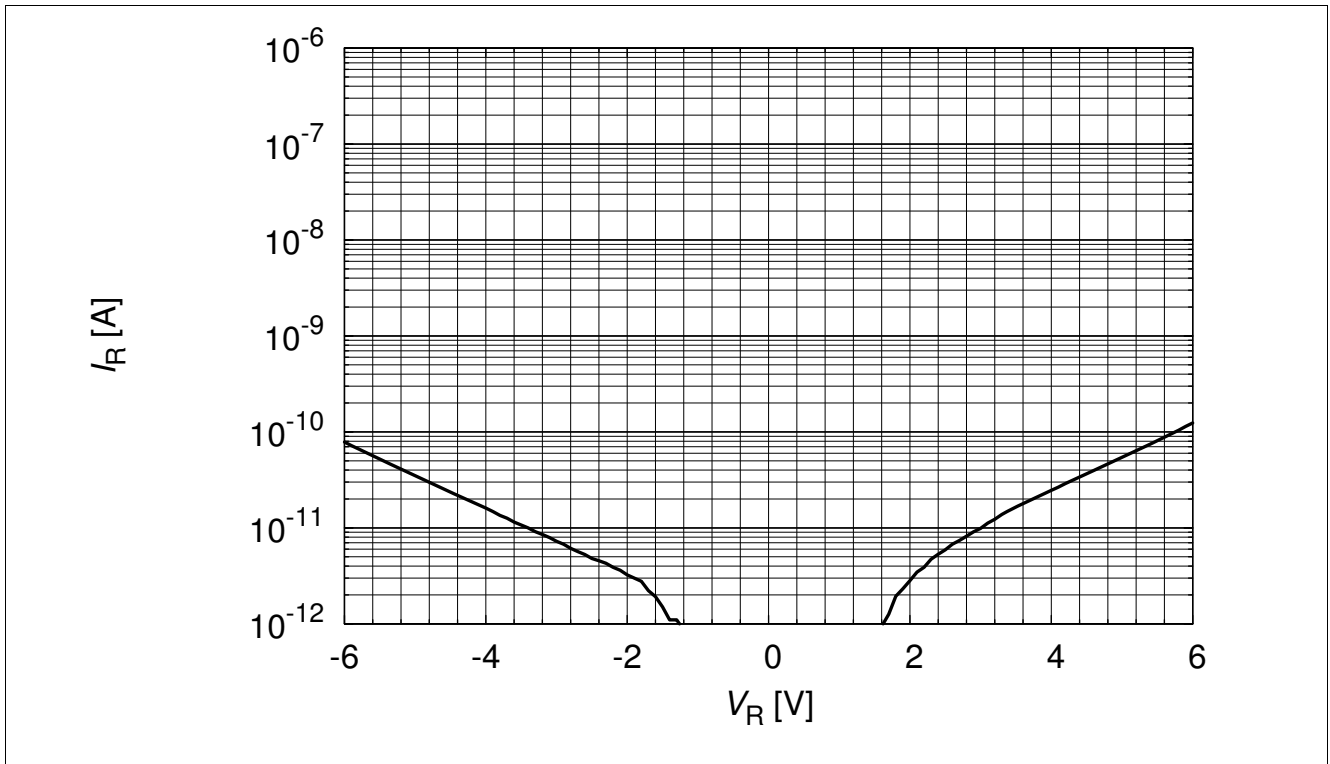


Figure 3-1 Reverse current: $I_R = f(V_R)$

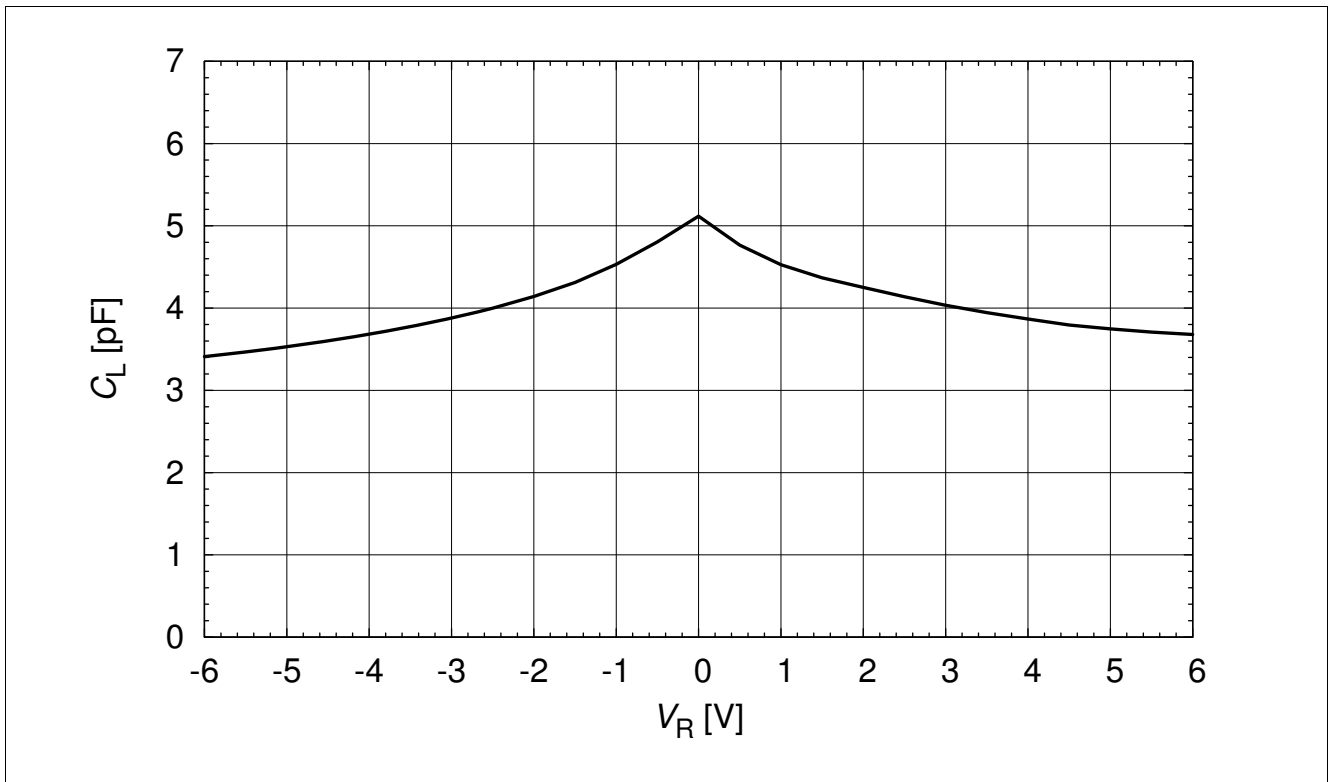


Figure 3-2 Line capacitance $C_L = f(V_R)$, $f = 1\text{ MHz}$

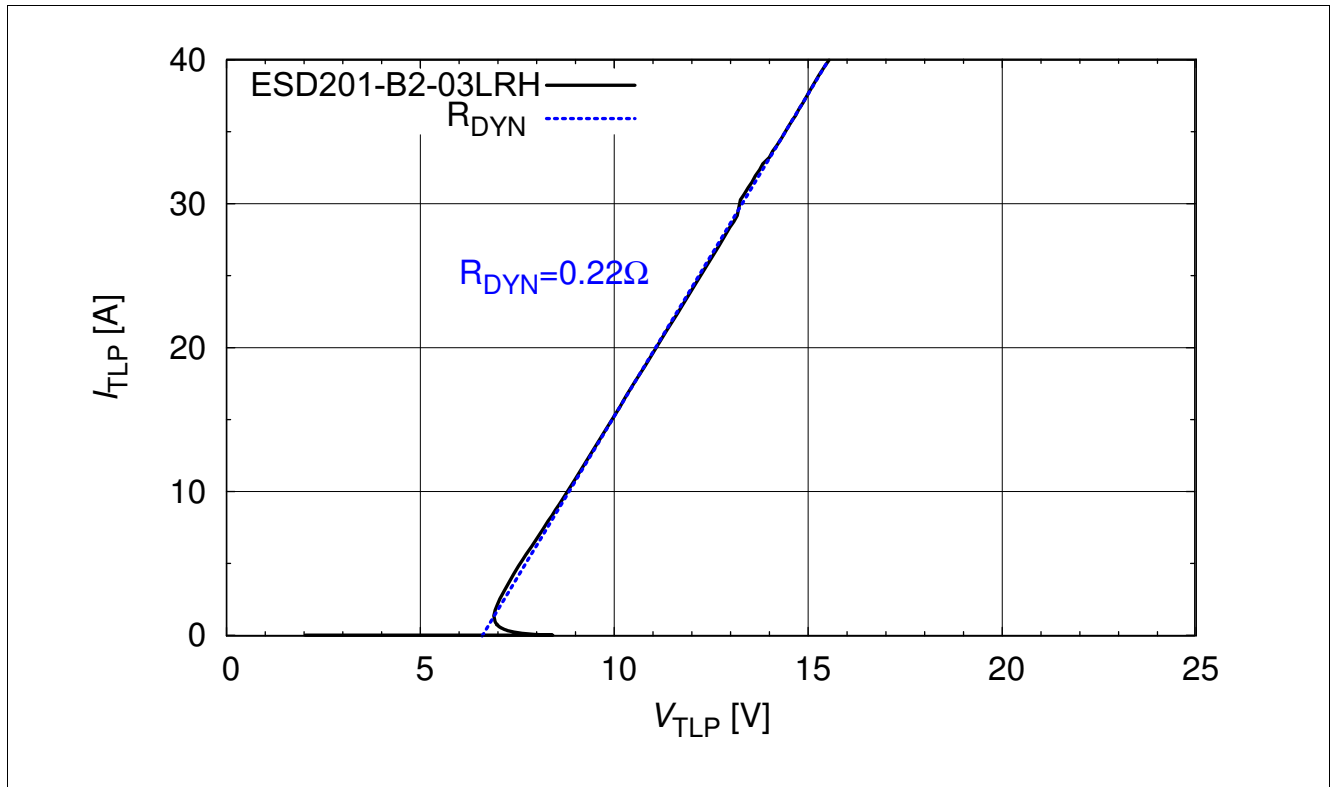


Figure 3-3 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ GND to Line

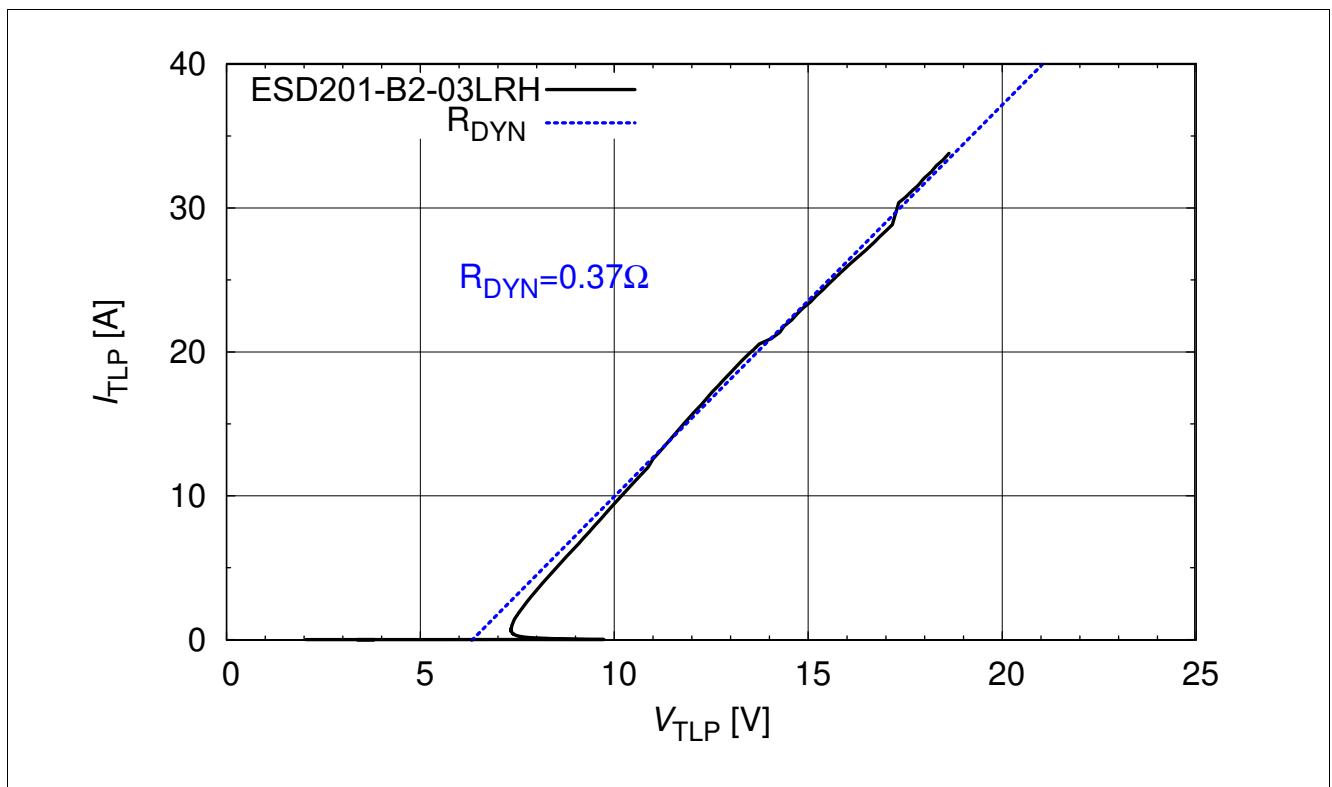


Figure 3-4 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ Line to GND

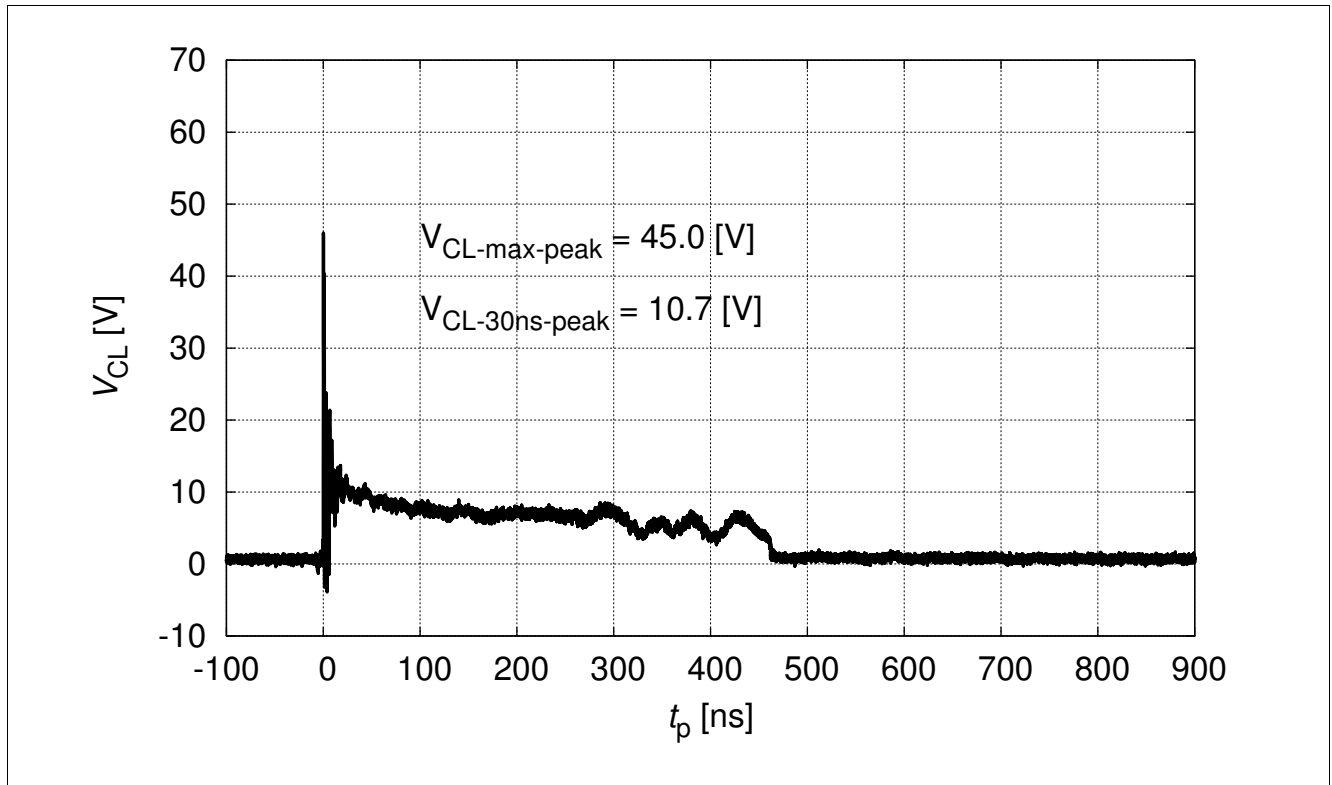


Figure 3-5 IEC61000-4-2: $V_{CL} = f(t)$, 8 kV positive pulse

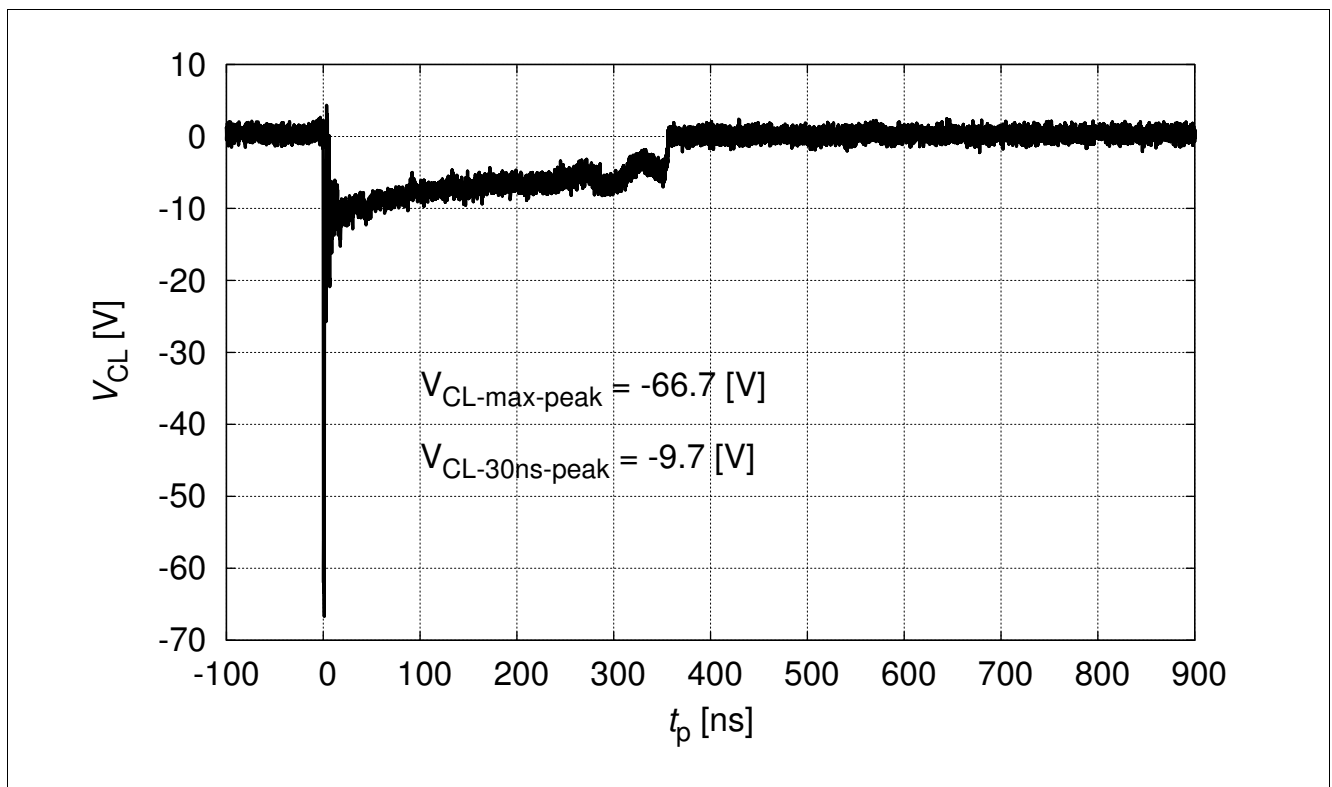


Figure 3-6 IEC61000-4-2: $V_{CL} = f(t)$, 8 kV negative pulse

4 Package Information

4.1 TSLP-3-9

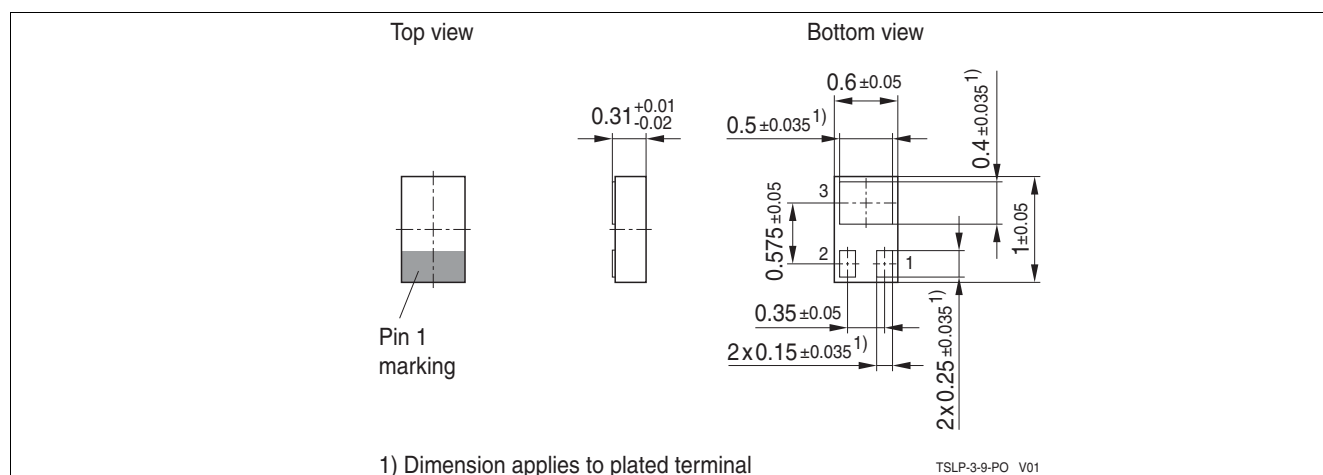


Figure 4-1 TSLP-3-9 Package outline

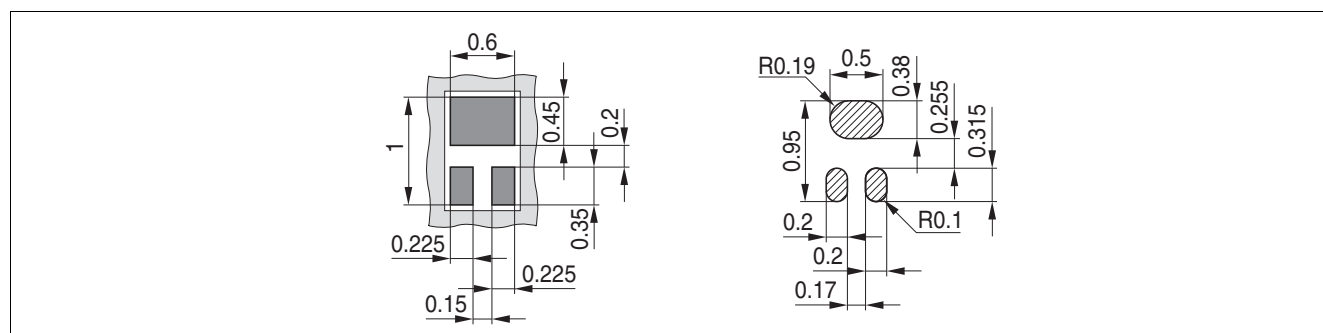


Figure 4-2 TSLP-3-9 Footprint

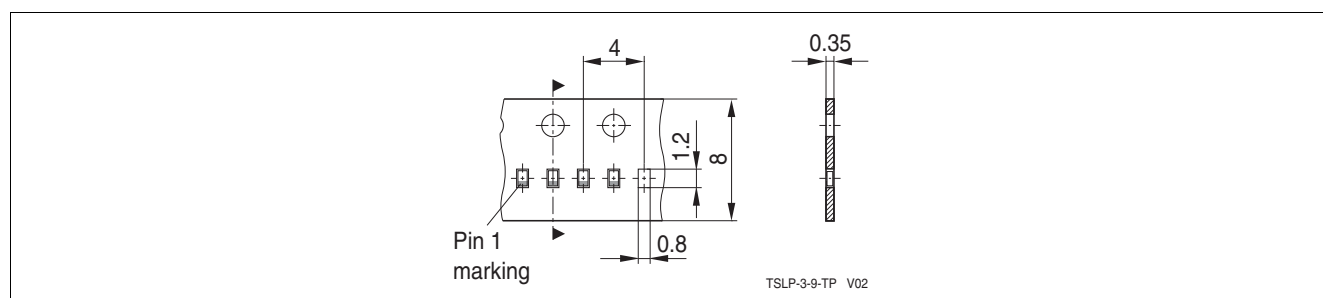


Figure 4-3 TSLP-3-9 Packing

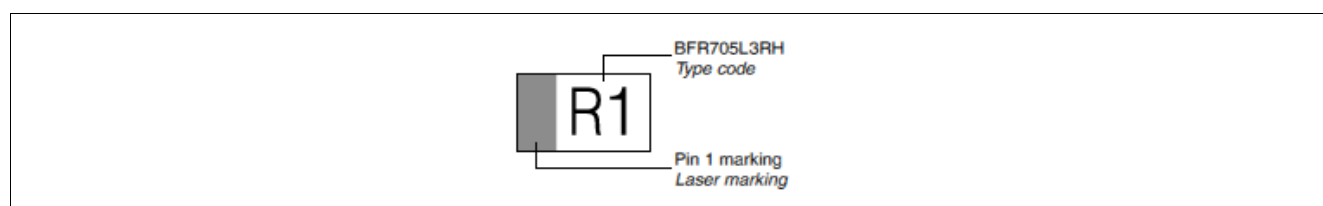


Figure 4-4 TSLP-3-9 Marking (example)

References

- [1] Infineon AG - **Application Note AN210:** Effective ESD Protection design at System Level Using VF-TLP Characterization Methodology
- [2] Infineon AG - Recommendations for PCB Assembly of Infineon TSLP and TSSLP Packages

www.infineon.com